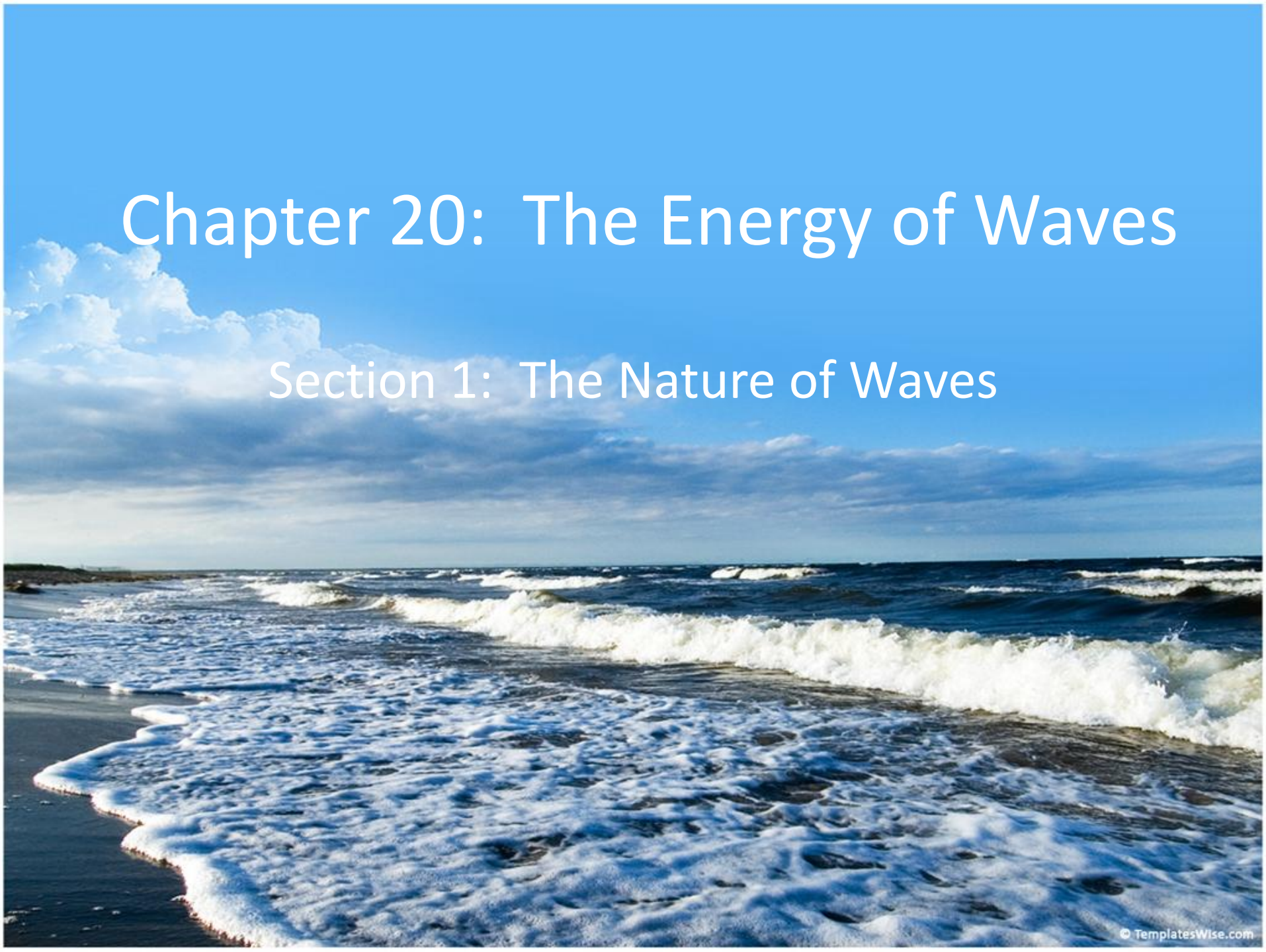
Chapter 20: The Energy of Waves

Section 1: The Nature of Waves



Vocabulary

- Wave: occasional disturbance in a solid, liquid, or gas as energy travels through it
- Medium: the physical environment where an action takes place
- Transverse waves: a wave in which the particles of a medium move perpendicular to a waves direction
- Longitudinal waves: a wave in which the particles of a medium move parallel to a waves direction

Wave Energy

- Wave: disturbance in a solid, liquid or gas made by energy
- Energy can be moved away from its' source by a wave
- Material a wave travels through does not move with the energy

Waves and Work

- Waves do work on everything in their path
- This is a transfer of energy

Energy Transfer through a Medium

- Medium (plural is media): substance through which a wave passes
  - Can be a solid, liquid, or gas
- When a particle vibrates, it passes energy to the next particle, and it continues on and on
- Even sound waves must travel through a medium, if there are no particles to vibrate, sound cannot occur
- Mechanical waves: waves that need a medium
  - EX: earthquake, ocean waves, waves from guitar & cello strings

Energy Transfer Without a Medium

- Electromagnetic waves can transfer energy without a medium
  - Do not need a medium, but can still travel through solids, liquids, or gases
  - Ex: visible light, X-rays, microwave ovens, and TV, radio & cell phone signals
- Light is an electromagnetic wave that you can see

Types of Waves

- Waves transfer energy by repeated vibrations
- Waves are classified based on the direction the wave moves AND the direction the particles move
- Transverse waves: particles vibrate in an up and down motion
  - Particles move perpendicular to waves' motion
  - Highest point is the crest, lowest point is the trough
  - All electromagnetic waves are transverse waves

Types of Waves

- Longitudinal waves: particles vibrate back and forth along path of the wave
  - Compression: part of longitudinal wave that is crowded
  - Rarefaction: part where longitudinal wave is spread out
  - Sound waves are longitudinal waves
- Surface wave: a combination of transverse and longitudinal waves
  - Look like transverse waves, but move in in circles
  - Move forward at crest, backward at trough